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RiceAdvice lite- a digital advisory tool for improving irrigated rice yield and profitability across west Africa

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Abstract

Rice is a major staple and strategic commodity in West Africa. Yet, productivity in key producing countries, such as Burkina Faso, Côte d'Ivoire, Ghana, Mali, Nigeria, and Sierra Leone, remains constrained by sub-optimal agronomic practices, inefficient fertiliser management, and increasing climate variability. Digital decision-support tools can help close yield gaps by translating local information into actionable, site-specific recommendations. Here, we assessed the agronomic and economic performance of a digital rice agronomy advisory, so-called RiceAdvice Lite (RAL), relative to farmers' practice (FP) across six countries under irrigated lowland and rainfed conditions. RiceAdvice Lite substantially improves both rice productivity and profitability relative to farmers' current practices. Overall, RiceAdvice Lite increased farmers' grain yield by an average of 1.2 t ha⁻¹ (53 %) and raised net profit by US\$153 ha⁻¹ (52 %) across the region. Under irrigated lowland conditions, yield gains attributable to RiceAdvice Lite were 1.1 t ha⁻¹ (29 %) in Nigeria, 0.6 t ha⁻¹ (10 %) in Burkina Faso, 1.7 t ha⁻¹ (56 %) in Mali, and 1.3 t ha⁻¹ (45 %) in Côte d'Ivoire. Corresponding increases in net profit were US\$137 ha⁻¹ (29 %), US\$71 ha⁻¹ (10 %), US\$206 ha⁻¹ (56 %), and US\$160 ha⁻¹ (45 %), respectively. In the rainfed lowland system, RiceAdvice Lite produced yield advantages of 0.8 t ha⁻¹ (21 %) in Nigeria, 1.4 t ha⁻¹ (115 %) in Sierra Leone, and 1.9 t ha⁻¹ (36 %) in Ghana, translating into net profit gains of US\$93 ha⁻¹ (20 %), US\$176 ha⁻¹ (115 %), and US\$235 ha⁻¹ (36 %), respectively. Collectively, these results confirm that RiceAdvice Lite can enhance rice yields across irrigated and rainfed lowlands by 10–115 %, while generating additional net profits of US\$71–235 ha⁻¹ compared with prevailing farmer practices. The consistent agronomic and economic benefits across countries and production systems highlight the value of RiceAdvice Lite as a scalable digital advisory approach to accelerate sustainable rice intensification and improve smallholder livelihoods in West Africa and, more broadly, sub-Saharan Africa.

Keywords: Farmers' practice, irrigated lowland rice, nutrient use efficiency, riceAdvice Lite, site-specific recommendation, West Africa